# PGDP KEVIL DMC
# MATERIAL TRANSFER FORM

received 3/15/00 CB

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| | |
|---|---|
| Document Title. Occurrence Report | Document Date: 11-30-99 |
| Document Number. ORO-LMES PGDPENVRES-1997-0001 | Page Count:. 10 |
| Author/Organization: | Facility/WAG/SWMU: |
| Project Program/Title: | Document Prep. Checklist Attached: ☐ Yes ☐ No<br>Clearance Form: (when required) Attached: ☑ Yes ☐ No |
| Keywords/Identifiers/ "Buzz Words"<br>1. _____ 2. _____ 3. _____<br>4. _____ 5. _____ 6. _____ | |
| * QA Record: ☐ Yes ☑ No | |
| Submitted by: B. Krelius Date: 3/13/00 Phone: 5790 | |

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## PORTION BELOW TO BE COMPLETED BY DMC STAFF

Comments: Given to DOJ - John Gregory 3/13/00
BJC Contact: Becky Krelius

| | |
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Indexed by: CB Date: 3/15/00

CP-20443
(5 5-16-95)

# PADUCAH EM&EF DOCUMENT RELEASE FORM

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SIGNATURE: Becky Keeling DATE: 3/13/00 TIME: 10:40

## DOCUMENT DESCRIPTION (TO BE COMPLETED BY REQUESTER)

DOCUMENT NUMBER: ORO-LMES PGDPENURES-A97-0001 PAGES: 10

DOCUMENT TITLE: Occurrence Report

AUTHORS(S) (INDICATE OTHER DIVISIONS OR ORGANIZATIONS, IF APPLICABLE): _____

DOCUMENT TYPE (SEE DOC. PREP. GUIDE, CHS. 1 AND 2, FOR DEFINITIONS OF DOCUMENT TYPES): ☐ DRAWING ☐ PHOTO ☐ FORMAL REPORT

☑ OCCURRENCE REPORT ☐ PROGRESS REPORT ☐ INFORMAL REPORT ☐ ABSTRACT ☐ CORRESPONDENCE ☐ OTHER VISUALS

☐ ADMINISTRATIVE RECORD DOCUMENT

☐ JOURNAL ARTICLE (IDENTIFY JOURNAL): _____

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CP-20382 (5 6-6-95)

BECHTEL JACOBS
Bechtel Jacobs Company LLC

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# OCCURRENCE REPORTING & PROCESSING SYSTEM (ORPS)
# TRANSMITTAL APPROVAL FORM

PROJECT
PADUCAH

| ICATS NUMBER | ORPS REPORT NUMBER |
|---|---|
| I - 00 32923 | ORO - ~~BJC~~ LMES - PGDPENVRES-1997-000 |

TITLE OF OCCURRENCE
USQ Related to DOE Material Storage Areas (.)

| OCCURRENCE DATE | CATEGORY: |
|---|---|
| 1/16/97 | ☐ EMERGENCY ☐ OFF-NORMAL ☑ UNUSUAL ☐ CANCELLED |

**REPORT TYPE:** (Check one.) ☐ UPDATE ☑ FINAL ☐ REJECTED FINAL ☐ SHORT FORM

Q-00010-0004

***REVIEWED FOR CLASSIFICATION AND DETERMINED TO BE UNCLASSIFIED AND TO CONTAIN NO UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION (UCNI)***

| | | |
|---|---|---|
| DERIVATIVE CLASSIFIER SIGNATURE: Emily Blasdel | DERIVATIVE CLASSIFIER PRINTED NAME: Emily Blasdel | DATE: 11/30/99 |
| RESPONSIBLE PERSON FOR REPORT PREPARATION: M Mosley | PROJECT: Waste Projects | 11/30/99 |
| OPTIONAL REVIEWER: R Scott | BADGE NUMBER: 15042 | DATE: 11/30/99 |
| MANAGER OF PROJECTS: R Scott for G. Dever | BADGE NUMBER: | DATE: 11/30/99 |
| APPROVED FOR RELEASE TO THE PUBLIC (Technical Information Officer, ETTP): C J Wirkler | BADGE NUMBER: 23491 | DATE: 11/30/99 |
| POR REVIEW (PRIOR TO TRANSMIT): D. L Chancellor | BADGE NUMBER: 11036 | DATE: 11/30/99 |
| ORS MANAGER (APPROVAL TO TRANSMIT): Emily Blasdel | | DATE: 11/30/99 |
| UPLOADING OF REPORT (ECA): Emily Blasdel | | DATE: 11/30/99 |
| FACILITY MANAGER DESIGNEE UPLOADING REPORT TO ORPS (PSS) | | DATE |

*This Approval /Transit form is for internal use only. DO NOT distribute this page with either the Update or the Final Report.*

Also reviewed by Joan Dunkirk, BJC Legal; who approved transmittal.

BJCF-167 (7-99)

ORO--LMES-PGDPENVRES-1997-0001 Prefinal Report

# Occurrence Report

DOE Approved Final Report on 12/8/99. See Section 34.

Environmental Restoration

(Name of Facility)

Uranium Enrichment

(Facility Function)

Paducah Gaseous Diffusion Plant Lockheed Martin Energy Systems, Inc.

(Laboratory, Site, or Organization)

**Name:** Gordon Dover
**Title:** Manager of Projects **Telephone No.:** (270) 441-5030

(Facility Manager/Designee)

**Name:** BLASDEL, EMILY J
**Title:** OCCURRENCE MANAGER **Telephone No.:** (502) 441-5163

(Originator/Transmitter)

**Name:** E.J. Blasdel **Date:** 11/22/1999

(Authorized Classifier (AC))

**1. Occurrence Report Number:** ORO--LMES-PGDPENVRES-1997-0001

USQ Related to DOE Material Storage Areas (1)

**2. Report Type and Date:** Prefinal

| | Date | Time |
|---|---|---|
| **Notification:** | 01/16/1997 | 10:03 (MTZ) |
| **Initial Update:** | 03/03/1997 | 09:18 (MTZ) |
| **Latest Update:** | 11/30/1999 | 15:01 (MTZ) |
| **Final:** | | |

**3. Occurrence Category:** Unusual

**4. Number of Occurrences:** 1 **Original OR:**

**5. Division or Project:** Environmental Restoration

**6. Secretarial Office:** NE - Nuclear Energy, Science and Technology

**7. System, Bldg., or Equipment:** DMSAs within PGDP Security Boundaries

**8. UCNI?:** No

**9. Plant Area:** DMSAs

**10. Date and Time Discovered:** 01/15/1997 10:50 (ETZ)

**11. Date and Time Categorized:** 01/15/1997 14:00 (ETZ)

**12. DOE Notification:**

| Date | Time | Person Notified | Organization |
|---|---|---|---|
| 01/15/1997 | 13:00 (ETZ) | JIMMIE HODGES | DOE-PGDP |

**13. Other Notifications:**

| Date | Time | Person Notified | Organization |
|---|---|---|---|
| 01/15/1997 | 15:35 (ETZ) | DAVID TIDWELL | DOE-PGDP |
| 01/15/1997 | 15:45 (ETZ) | DAVID MILAN | LMES |
| 07/21/1998 | 16:35 (ETZ) | GREGORY BAZZELL | DOE |

**14. Subject or Title of Occurrence:**

USQ Related to DOE Material Storage Areas (1)

**15. Nature of Occurrence:**

01) Facility Condition
C. Safety Status Degradation

**16. Description of Occurrence:**

The PGDP process facilities are leased by DOE to the United States Enrichment Corporation (USEC), and Lockheed Martin Utility Services, Inc. (LMUS) operates these process facilities for USEC under the regulation of the Nuclear Regulatory Commission (NRC).

On January 1, 1997, the Department of Energy (DOE) accepted the responsibility for facilities identified as DOE Material Storage Areas (DMSAs). There existed no accurate inventories of nuclear or toxic material within the DMSAs to allow adequate characterization. Specific hazard screening documentation for the DMSAs also did not exist. Furthermore, the material within the DMSAs did not meet the Contractor waste acceptance criteria in effect at the time. Without an accurate radionuclide inventory, it could not be ascertained if the DMSAs required Nuclear Criticality Safety (NCS) evaluation or controls due to quantities of fissionable material exceeding DOE-STD-1027-92 thresholds. No NCS documentation existed which complied with the requirements specified in the Environmental Management and Enrichment Facilities (EMEF) Phase II Work Smart Standards.

On January 15, 1997, notification was made that Lockheed Martin Energy Systems, as Contractor to DOE, would be responsible for the safety, safeguards, and security of the DMSAs. In accordance with requirements of Section 10.d of DOE Order 5480.21, verbal notification was made to the DOE Paducah site office that a potential unreviewed safety question (USQ) existed. Interim operational restrictions were mutually developed to place the facilities in a safe condition. Movement of fissionable material in

DMSAs was strictly prohibited until the appropriate, approved command media could be developed for project execution. Documentation needing development included the required NCS documentation, operating procedures to flowdown NCS requirements, case-specific training associated with the NCS documentation, and area posting and labeling. The following day, occurrence report ORO-LMES-PGDPENVRES-1997-0001 was initiated.

On July 21, 1998, a USQ condition was reported based on the results of non-destructive analysis (NDA) performed on an axial compressor stored in DMSA 31 in the C-333 process building. This occurred as a result of provisions included in a DOE-United States Enrichment Corporation (USEC) agreement for the transfer of material back to USEC. In this process of assessing items requested by USEC for transfer, the compressor was analyzed by radiation survey. The NDA indicated that the compressor contained less than 1737 grams of 235U at an assay of 1.157 wt%. The event was reported as a USQ since no NCS analysis or documentation had been prepared by the Contractor or approved by DOE for the control of fissionable materials in the DMSA in accordance with the requirements of Section 6.1 of KY/EM-174, Revision A, Safety Analysis Report (SAR) - Paducah Gaseous Diffusion Plant, or Section 5.4.1.3 of KY/EM-175, Revision 0, Technical Safety Requirements (TSR) - Paducah Gaseous Diffusion Plant DOE Nonleased Facilities. The DMSA has the required Criticality Accident Alarm System (CAAS) coverage.

On July 21, 1998, this occurrence report was upgraded from an Off-Normal to an Unusual based on the positive USQ.

The SAR specifies that nonleased facility operations involving more than 700 grams 235U of fissile material shall be analyzed for the application of NCS controls. The TSR adds that, for each instance where double contingency is not met, technically evaluated and documented exceptions must be provided to and approved by DOE. Safety Evaluation EM&EF 97-002, "Deleasing of DOE Material Storage Areas," initiated January 15, 1997, was completed October 8, 1998. A "backward looking" Safety Evaluation was performed against the authorization basis at the time of initiation which concluded that the issue constituted an USQ. On August 17, 1998, the compressor was removed from DMSA 31 in C-333 employing endorsed leased-facility NCS documentation (doubly-contingent) and ownership was transferred to USEC.

Key Points:

In accordance with Section 10.d of DOE Order 5480.21, Unreviewed Safety Questions, DOE was notified of the situation on January 15, 1997. Interim control measures to ensure the continued safety of the areas were established and approved by the Paducah DOE Site Office.

Occurrence Report ORO--LMES-PGDPENVRES-1997-0001 was filed to establish that all the DMSAs constituted a potential USQ until accurate inventories of nuclear or toxic material within the DMSAs were completed to enable adequate characterization.

On July 21, 1998, this occurrence report was recategorized as an Unreviewed Safety Question (USQ) due to the presence of fissionable materials in excess of 700 grams of Uranium 235.

**17. Operating Conditions of Facility at Time of Occurrence:**

Normal Operations

**18. Activity Category:**

03 - Normal Operations

**19. Immediate Actions Taken and Results:**

No work will be allowed in these areas until the appropriate nuclear criticality safety documentation has been completed and approved by DOE. Preliminary characterization efforts by LMES segregated the DMSAs into Phase 1 DMSAs (expected to have no significant U235 accumulations) and Phase 2 DMSAs (items possibly containing fissionable assay deposits). This preliminary characterization was based on walkdowns performed January 21, 1998 and January 26, 1998 by an Nuclear Criticality Safety (NCS) specialist and subject matter expert using process knowledge.

**20. Direct Cause:**

8) Radiological/Hazardous Material Problem
A. Legacy Contamination

**21. Contributing Cause(s):**

6) Management Problem
F. Other Management Problem

**22. Root Cause:**

6) Management Problem
A. Inadequate Administrative Control

**23. Description of Cause:**

A contributing cause has been determined to be other management problems due to the fact that existing characterization data for some materials contained in the posted areas is incomplete in determining if these areas contain nuclear or toxic contamination.

The direct cause has been determined as legacy contamination due to the potentially fissionable assay materials stored in the DMSAs.

The root cause has been identified as inadequate administrative controls. This was due to the failure of the material owner(s) to characterize the potential radionuclide and toxicity levels of the materials.

Corrective actions, determined through cause and effect analysis, include characterization of the materials within all DOE Materials Storage Areas (DMSAs) to determine whether or not they contain fissionable assay or toxic materials. The disposition of items will be based on that characterization.

See Section 26 for a description of the corrective actions that were done in relation to this specific occurrence and related project documentation corrective actions.

**24. Evaluation (by Facility Manager/Designee):**

The May 28, 1996, United States Enrichment Corporation (USEC) and DOE Agreement for DOE Material Storage at the Gaseous Diffusion Plants, specified that USEC had the financial and physical responsibility for DMSA corrective actions. Uncharacterized materials owned by USEC were stored in areas of buildings that were leased by USEC from DOE. This was identified as a compliance plan issue that needed to be addressed for Nuclear Regulatory Commission certification of the Gaseous Diffusion Plants and licensing of USEC.

On December 19, 1996, Lockheed Martin Energy Systems (LMES) issued a package to the Paducah DOE Site Office which contained recommendations for areas to conditionally accept as DMSAs, including a detailed discussion of each of the proposed areas.

On December 19, 1996, the Paducah DOE Site Office issued a letter to Lockheed Martin Utility Services (LMUS) detailing the general requirements necessary for DOE to accept ownership of the DMSAs and what type of DMSA DOE would not accept.

On December 31, 1996, Exhibit A of the Lease Agreement between the Department of Energy and the United States Enrichment Corporation DOE Material Storage Areas was issued, and identified 148 DMSAs at Paducah and 40 DMSAs at Portsmouth. The additional DMSAs were created in support of the Seismic Upgrade Project on August 28, 1998. Exhibit A also contains the DMSA site-specific Memorandum of Agreement Between DOE and USEC at PGDP Regarding Deleased Material Storage Areas which reiterates USEC's financial responsibility for corrective actions within DMSAs.

On January 15, 1997, LMES was made responsible for the DMSAs and verbal notification was given to DOE.

On January 16, 1997, occurrence report ORO--LMES-PGDPENVRES-1997-0001 was issued identifying the DMSAs as a potential unreviewed safety question due to lack of accurate inventories for nuclear, radiological, and toxic materials.

On January 17, 1997, the Prioritization Plan for Deficiencies in DMSAs was issued at Paducah identifying the priority for correcting deficiencies in the DMSAs.

On February 25, 1997, the Inventory of DOE Material Storage Areas was issued for Paducah which identified, in general, the types and approximate quantities of the materials in DMSAs.

On August 15, 1997, the May 28, 1996 USEC and DOE Agreement for DOE Material Storage at the Gaseous Diffusion Plants was revised to address non-destructive assay (NDA) requirements.

On January 29, 1998, DMSAs were identified as Phase I or Phase II. Phase I DMSAs contain no fissionable material based upon walkdowns performed by the LMES NCS Specialist.

On January 30, 1998, the first internal Readiness Review was conducted to obtain approval to begin field activities within Phase I DMSAs. Field activities included waste handling and characterization activities of NCS-Exempt equipment and waste. Subsequent reviews of other Phase I DMSAs were also completed.

In order to address the potential toxic material concerns, the DMSA Project documents required the following be developed on each DMSA prior to beginning work activities. Pre-Task Hazard Reviews were conducted prior to field activities commencing. These are included in the following:

-- DMSA specific Waste Generation Plan;
-- DMSA specific Sampling and Analysis Plan;
-- DMSA specific Work Plan;
-- DMSA specific Safety and Health Permits;
-- DMSA specific Requests for Disposal (RFDs); and
-- DMSA specific Radiological Surveys.

Most of the remaining materials in DMSAs remain uncharacterized at this time. Since the material within the DMSAs was introduced without characterization or application of NCS controls and the radionuclide content is not documented or verifiable, an accidental criticality in the current storage arrays may only be prevented by one or more, undocumented parameters, referred to as Random Factors of Safety (RFS). Thus, precautions must be taken to ensure that the potential for compromising any undocumented control is minimized. A NCS Evaluation (NCSE) and a subsequent NCS Approval (NCSA) for the DMSA project were then developed to minimize the potential adverse impact of characterization, movement, and disposition activities which could compromise the RFS.

The characterization and disposition of items involves implementing controls specified in the

NCSE/NCSA to achieve compliance with the double contingency principle (DCP). However, until the items are relocated from their present array, this principle cannot be satisfied. Consequently, failure to meet the DCP requirements in accordance with K-2106, Environmental Management and Enrichment Facilities (EMEF) Phase 2 Work Smart Standards (WSSs) for Environment, Safety, and Health, Revision 3, requires DOE approval prior to initiation of remedial actions.

Techniques that will be used in the initial characterization of material within the DMSAs will include documentation reviews, application of process knowledge, visual inspection, and assay determination using smears. Since many of the items have not been exposed to the enrichment process gas streams, there is negligible potential that they contain significant fissionable material deposits. These items are considered NCS-exempt and will be carefully relocated to minimize disturbance of the array. This approach relies heavily on informed judgement for initial characterization.

On February 5, 1998, the Paducah DOE Material Storage Area Corrective Actions Project Plan was approved and was specifically written to address the:

-- development of the required NCSE, NCSA, and implementing procedure;
-- completion of the inventory of equipment and waste;
-- draining of fluids as needed;
-- sampling and characterization of the wastes where necessary;
-- performing NDA as necessary;
-- relocating and/or storing material to provide adequate accessibility for inspectoins;
-- dismantling and removing process equipment abandoned in place;
-- restoring adequate lighting; and
-- disposing of appropriate waste in the DOE landfill.

On August 17, 1998, the compressor was removed from DMSA 31 in the C-331 process building, employing LMUS NCS controls, and ownership was transferred to USEC. Additional items within DMSA 31 were handled utilizing the established LMUS Nuclear Criticality Safety (NCS) Approvals GEN-27 and GEN-32, and their associated LMUS procedures. These items included additional compressors, discharge nozzles, coolers, stators, and carts. All non-NCS equipment was relocated within DMSA 31 after verification that these items did not exceed acceptable mass and enrichment levels.

NOTE: The delay in submitting this as a final occurrence report resulted from the initial attempt to combine DMSA-related USQs into one report. The report has now been broken down into two separate occurrences. See also ORO--BJC-PGDPENVRES-1999-0022.

**25. Is Further Evaluation Required?:** No

**26. Corrective Actions**
(* = Date added/revised since final report was approved.)

1. General field activities are performed in accordance with procedure FS-C-7201, Administration of Paducah DOE Material Storage Areas, Revision 0. Additionally, the following documents were completed to address potential nuclear criticality safety issues:

   -- FS-C-7202, NCS Characterization, Movement, Storage and Disposition for Fissionable Material Within Paducah DOE Material Storage Areas, Revision 0, approved 4/12/99;

   -- FS-C-7201, Administration of Paducah DOE Material Storage Areas, approved 10/4/99;

   -- BJC/PAD/32, Nuclear Criticality Safety Evaluation for Characterization, Movement, Storage and Disposition of DMSA Materials, approved 8/18/99;

   -- NCSA 98-001, Characterization, Movement, Storage and Disposition for Fissionable Material Within DOE Material Storage Areas, approved 8/17/99;

   -- FS-C-7202, NCS Characterization, Movement, Storage and Disposition for Fissionable Material Within Paducah DOE Material Storage Areas, Revision 1, approved 10/4/99;

   -- Training module WM101CR00, DMSA NCS Characterization Activities for Operators, and training of the operators; and

   -- Training module WM102CR00, DMSA NCS Characterization Activities for Supervisors, and training of the supervisors.

   **Target Completion Date:** 10/04/1999 **Completion Date:** 10/04/1999

**27. Impact on Environment, Safety and Health:**

No immediate impact was ascertained, and none have been discovered to date. Further characterization will determine any long-term or significant impacts.

**28. Programmatic Impact:**

Movement of materials within these DMSA(s) will not occur until the appropriate NCS documentation is approved and characterization is complete.

**29. Impact on Codes and Standards:**

None

**30. Lessons Learned:**

Procedure FS-C-7202, Rev. 1, NCS Characterization, Movement, Storage, and Disposition of Fissionable Material Within Paducah DOE Material Storage Areas, has been developed. This describes the activities to be performed and any uncertainties associated with Nuclear Criticality Safety.

In addition, NCSA 98-001, Characterization, Movement, Storage and Disposition for Fissionable Material Within DOE Material Storage Areas, was approved on 8/17/99, and BJC/PAD/32, Nuclear Criticality Safety Evaluation for Characterization, Movement, Storage, and Disposition of DMSA Materials, was approved on 8/18/99. These documents comprise the safety basis from which the Bechtel Jacobs Company Procedure FS-C-7202 was developed. If the NCSA and NCSE had been developed and approved prior to characterization and removal of the compressor for USEC, an Unreviewed Safety

Question would not have existed.

**31. Similar Occurrence Report Numbers:**

1. ORO--LMES-PGDPENVRES-1995-0001

**32. User-defined Field #1:**

Reference ID I0032923

**33. User-defined Field #2:**

**34. DOE Facility Representative Input:**

This is acceptable as a final report. The DMSAs were created during the certification of the uranium enrichment facilities by the Nuclear Regulatory Commission (NRC). The uranium enrichment facilities were leased to the United States Enrichment Corporation (USEC) and regulatory oversight of the facilities transitioned to NRC. The legacy DOE equipment and materials in these facilities was consolidated in specific areas and posted as DMSAs. The initial report identified a potential USQ due to these materials not being adequately characterized. This was upgraded to an Unusual Occurrence when a piece of equipment (a compressor) that USEC wanted back out of a DMSA was found to contain greater than one weight percent U-235 and did not have a nuclear criticality safety apporval. That piece was transferred to USEC using their NCSA (since they had one for the uranium enrichment process equipment). Therefore, the specific compressor was addressed by an NCSA but the NCSA for characterization of the DMSA was not yet completed.

In late CY1998 and most of CY1999, DOE and Bechtel Jacobs have been resolving comments on the NCSA for the DMSA characterization activities. The NCSA was completed and it was determined to be a USQ because it could not ensure double contingency for characterization activities. The NCSA was approved by DOE in September 1999 and procedures and training were developed based on the NCSA and DOE Safety Evaluation Report.

Part of the reason for the delay in this report was to ensure the NCSA was developed and implemented to prevent any other material being found in the DMSAs from resulting in another USQ. However, since this report was upgraded to an Unusual Occurrence, the second USQ (on the singularly contingent NCSA) could not be grouped under this occurrence. Therefore, a second USQ occurrence report (ORO--BJC-PGDPENVRES-1999-0022) was initiated at DOE direction.

Currently, there is an NCSA and subsequent procedures and training to perform the DMSA characterization activities in accordance with a DOE approved authorization basis. Therefore, this occurrence report is acceptable as a final report.

Entered by: BAZZELL, GREGORY A Date: 12/07/1999

**35. DOE Program Manager Input:**

Scott Harlow was reassigned to the Office of Nuclear Facilities Management, Office of Nuclear Energy. He no longer has authority to sign occurrence reports from Portsmouth and Paducah.

Entered by: HARLOW, SCOTT E Date: 12/08/1999

**36. Approvals:**

**Approved by:** Gordon Dover, Facility Manager/Designee
**Date:** 11/30/1999
**Telephone No.:** (270) 441-5030

**Approved by:** BAZZELL, GREGORY A, Facility Representative/Designee
**Date:** 12/07/1999
**Telephone No.:** (270) 441-6808